Also inside: Time To Break Up Microsoft? Not So Fast **40**

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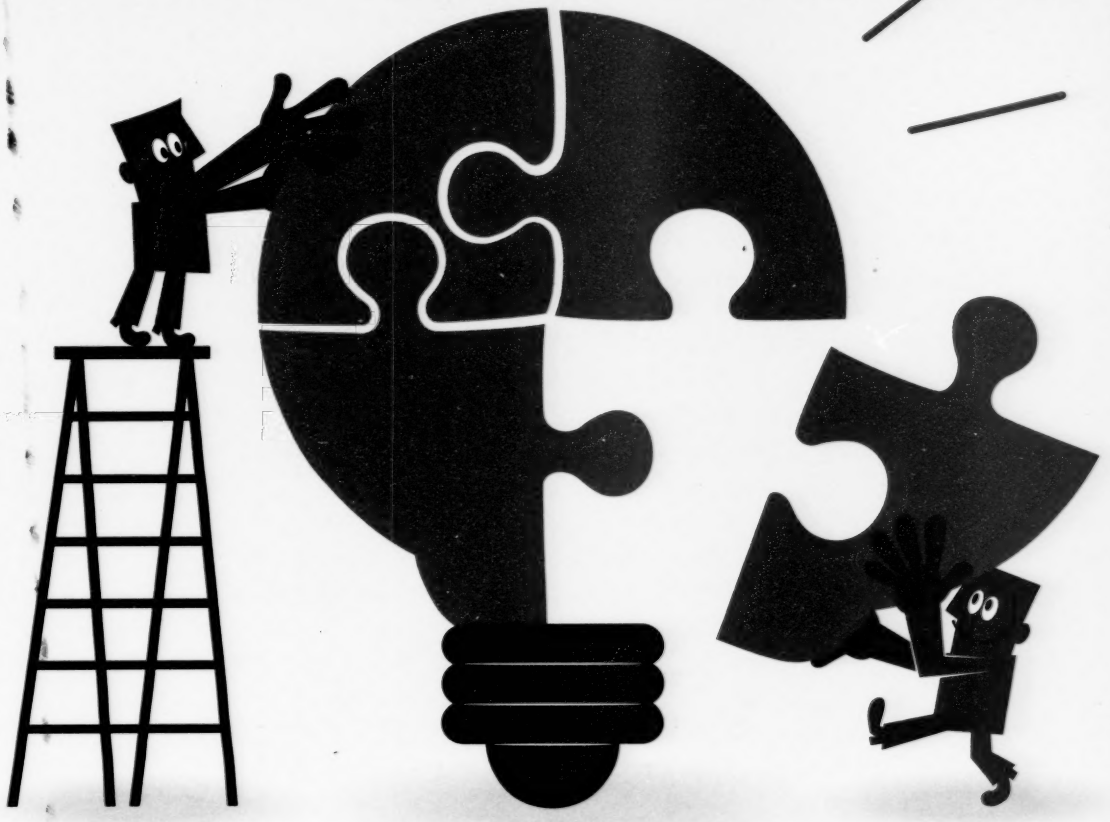

FORECAST 2014

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- Boost Your Mobile Bandwidth
- Nab the Hottest IT Skills
- Master Disruptive Technologies

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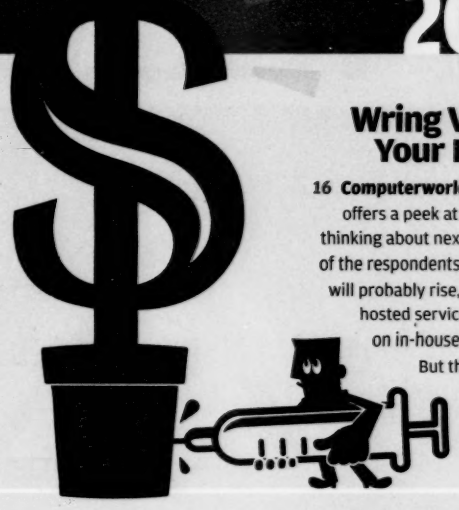

Wring Value From Your IT Budget

16 Computerworld's Forecast 2014 survey offers a peek at what IT leaders will be thinking about next year. Most notably, 36% of the respondents said that their IT budgets will probably rise, and that investments in hosted services will outpace spending on in-house hardware and software. But they will still be challenged to do everything while containing costs.

Boost Your Mobile Bandwidth

22 As IT executives watch mobile devices and cloud-based systems mercilessly hammer their wireless and wired networks, many anticipate that they'll need to find ways to add bandwidth and keep traffic flowing in 2014 and beyond.

Nab the Hottest IT Skills

28 The Forecast 2014 list of the eight IT skills that will be most in demand next year leads off with programming and application development in the No. 1 spot – again.

Master Disruptive Technologies

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OPINION 36 Futurist **Thornton A. May** says in 2014, IT leaders will need to have regularly scheduled meetings that actively and aggressively seek to make sense of the changing world around them.

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2 Could **DEC's demise** offer lessons for Microsoft? | In a mixed **IT job market,** Boston and San Francisco shine. | **4** Some say **encryption** is still the best **security tool,** despite the NSA's code-cracking. | Two **Indian outsourcers** top the list of **L-1 visa** users.

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IT INDUSTRY

DEC's Demise Is a Lesson for Microsoft

MICROSOFT has heaped so many stresses onto its corporate body in the past 10 months that it will have to beat almost insurmountable odds in order to remain viable, a business strategist said.

But Microsoft is by no means unique in the IT industry. "There's something endemic in technology companies that they are not built to last," said Peter DeLisi, founder and president of Fremont, Calif.-based Organizational Synergies.

DeLisi wasn't predicting Microsoft's collapse, but he does have firsthand knowledge of how a high-flying tech company can crash to earth: He spent 16 years at Digital Equipment Corp. (DEC), which was the world's second-largest computer company in the late 1980s but had disappeared by 1996, when Compaq bought it at a fire sale price of $9.6 billion.

In 1998, DeLisi wrote a paper about DEC's decline, and his insights have led some current and former Microsoft employees to draw parallels between their employer and DEC. The paper was mentioned numerous times by commenters responding to a post about Microsoft CEO Steve Ballmer's retirement in the blog Mini-Microsoft, which is purportedly written by a current Microsoft employee.

DeLisi was hesitant to cast Microsoft as a DEC doppelganger because he has never worked at Microsoft, but he did say that the company has stacked the deck against itself.

The biggest problem Microsoft faces is its search for a new CEO, said DeLisi, noting that it may be hard to find the right person to lead the company through these challenging times.

– Gregg Keizer

IT CAREERS

Boston, SF Shine In Mixed U.S. IT Job Market

IT employment is showing signs of slowing, but not everywhere. The Federal Reserve said that in some markets – Boston and San Francisco in particular – demand for certain tech skills outstrips supply.

The latest edition of the Federal Reserve's Beige Book, as the central bank's commentary on regional economic conditions is called, says that in the New England area, "there remains a shortage of skilled technical workers to fill high-end IT and engineering jobs."

In San Francisco, the Fed reported, demand is forcing employers "to compete vigorously for a limited pool of qualified workers . . . spurring significant wage growth."

However, the National Association of Colleges and Employers recently reported that the average starting salary for computer science graduates this year fell 2.5% from last year – to $58,547 from $60,038.

But while starting pay may be lower on average, San Francisco and New England aren't the only locales with strong job markets. The Fed found "large compensation increases" for IT professionals in areas such as Atlanta and Kansas City.

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However, the Fed also reported that the hiring picture is mixed in much of the rest of the U.S., and that some tech companies in St. Louis, for example, reported plans to reduce employment.

- PATRICK THIBODEAU

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BETWEEN THE LINES
By John Klossner

SECURITY

Encryption Is Best, Despite NSA

THOUGH THE National Security Agency spends billions of dollars to crack encryption codes, security experts maintain that, properly implemented, encryption is still the best way to secure data.

Citing documents leaked by former NSA contract employee Edward Snowden, U.K. newspaper *The Guardian* and other media outlets have reported that the NSA and its British counterpart, the GCHQ, have cracked encryption algorithms that are widely used to protect online communications, banking and medical records, and corporate data.

But Steve Weis, CTO at security vendor PrivateCore, said despite the NSA activities, the mathematics of cryptography remain very hard to crack.

Weis, who holds a doctorate in cryptography from MIT, suggested that it's likely that the NSA managed to break through insecure and outdated implementations of some encryption technologies.

For example, the leaked documents suggest that the NSA built a back door into an encryption standard called Dual EC DRBG, which is used to generate random numbers. Weis noted that the Dual EC DRBG standard has been available for six years but has been rarely used since two Microsoft engineers discovered the NSA hack.

It remains unclear whether NSA experts have the ability to crack more robust encryption technologies, Weis said. "So far, I've not seen anything to suggest than an algorithm like [the Advanced Encryption Standard] has been broken."

Weis advised concerned enterprises to use open-source technologies like OpenSSL — whose code is always visible to developers — rather than commercial software. "The code is there for people to audit and you can see the changes," he said. "At least you have some assurance that there is no intentional vulnerability" built into the software.

– Jaikumar Vijayan

Micro Burst

IBM is investing

$1 billion

to promote Linux development. What about AIX?

OUTSOURCING

IT Outsourcers Are the Leading Users of L-1 Visas

The IEEE-USA is calling for reform of the L-1 visa program following the release of a government report that identified offshore IT service providers as the biggest users of the visa.

In the report, the inspector general of the U.S. Department of Homeland Security said that some of the L-1 visa program's rules are vague and the program is vulnerable to fraud and abuse.

The L-1 visa allows multinational companies to transfer foreign employees into the U.S. Unlike the H-1B visa, there is no cap or prevailing wage requirement with the L-1.

The largest users of the L-1 visa are companies either based in India or with operations there, said the report, compiled at the request of Sen. Chuck Grassley (R-Iowa), the Senate's leading critic of H-1B visas.

From 2002 to 2011, Tata Consultancy Services and Cognizant received nearly 26,000 and 20,000 petitions, respectively, making them the top users by far. The third-largest user was IBM India, which received 5,722 L-1 petitions.

The L-1 program has become "a tool for shipping American jobs overseas," said Marc Apter, president of the IEEE-USA, a professional organization for engineers, in a statement calling for L-1 visa reform.

– PATRICK THIBODEAU

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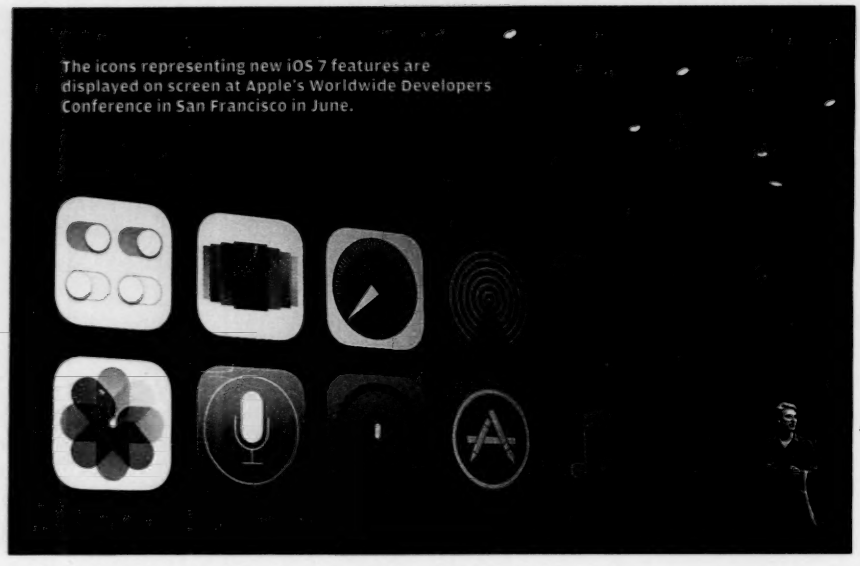


The icons representing new iOS 7 features are displayed on screen at Apple's Worldwide Developers Conference in San Francisco in June.

iOS 7, New iPhones May Catch On in the Enterprise

The latest iteration of Apple's mobile operating system could finally bring enterprise-level security and management tools to iPhones and iPads, analysts say. By Matt Hamblen

APPLE'S SMARTPHONES may quickly become more attractive to enterprise workers and their IT departments thanks to the company's updated mobile operating system, iOS 7, which became available with the new iPhone 5s and iPhone 5c last week. The new operating system is now available for Apple's iPad tablet as well.

Apple said that iOS 7 has about 200 new features, including the greatest number of functions designed specifically for enterprise use since the release of iOS 4 more than three years ago.

Most important for IT managers, analysts say, is that iOS 7 includes application programming interfaces (API) for building links to mobile device management (MDM) software tools used by many corporate IT shops. The update also adds single sign-on (SSO) functionality, support for multitasking and a standard method for embedding management features in enterprise applications.

In a Gartner report issued last month, analyst Ken Dulaney wrote that "iOS 7 will have a high impact for enterprise IT leaders in terms of security and management." He called on enterprise IT shops to test iOS 7 for use with their MDM software consoles. The iOS 7 updates "will most certainly deepen the [enterprise's] relationship and commitment to Apple," he wrote.

Dulaney did note that Apple still doesn't have its own network operations center like rival BlackBerry does, so the implementation of a management console for iOS 7 must come from a third-party MDM provider. But the list of MDM vendors is a long one, and includes old-line companies such as IBM and Microsoft along with several others, such as Good Technology, AirWatch, Mobile Iron, Citrix and Symantec.

Jack Gold, an analyst at J.Gold Associates, agreed that the updated iOS software does have some strong IT-targeted features, but he contends that the BlackBerry Enterprise Server still offers a "greater breadth and depth of management" for BlackBerry devices than iOS 7 with third-party MDM consoles can provide for iPhones. BlackBerry Enterprise Server capabilities for platforms other than BlackBerry is less comprehensive, he noted.

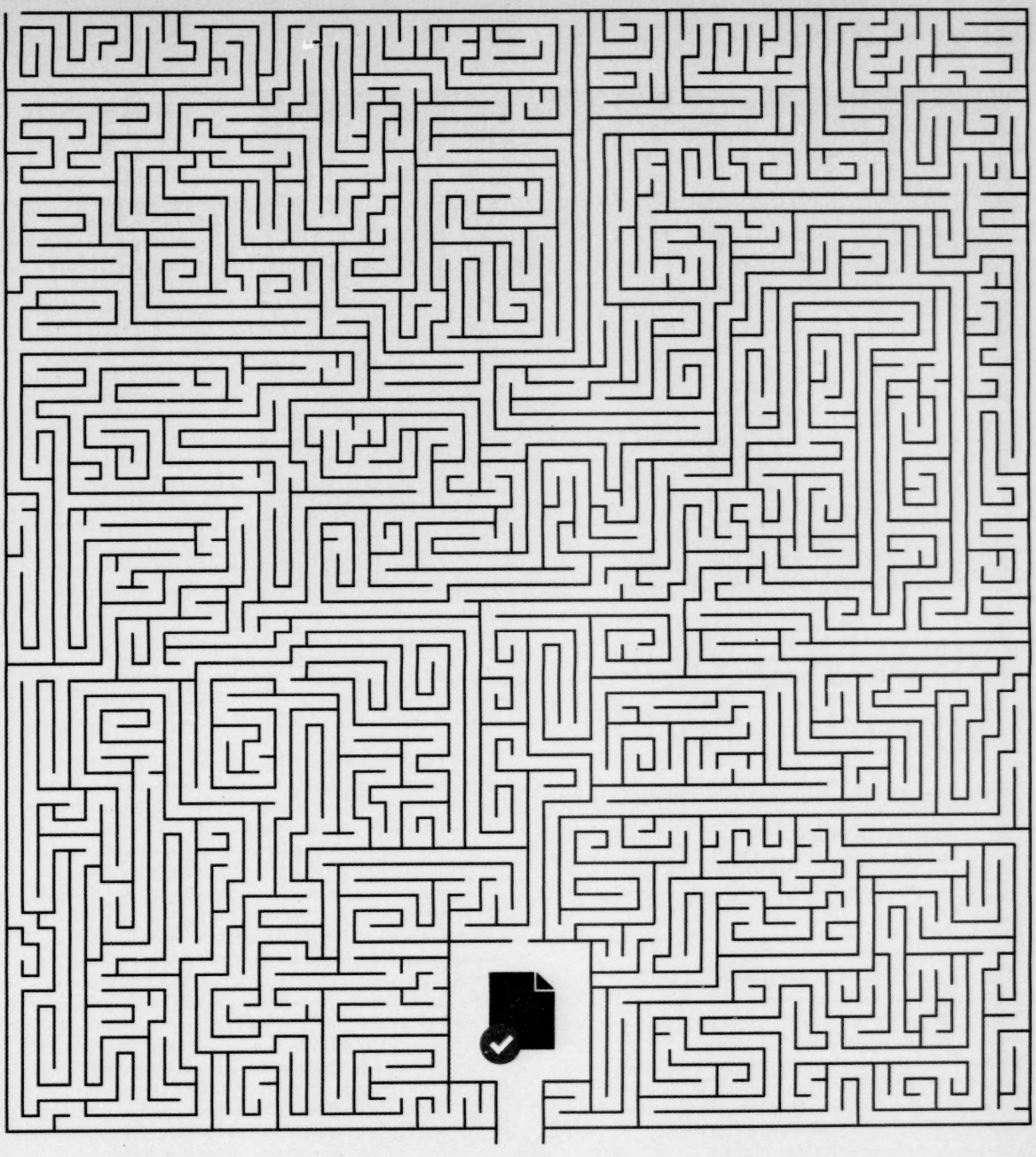
The new iPhone 5s and iPhone 5c handsets themselves could offer as-yet unseen benefits, but at the same time pose some challenges to business users and corporate IT departments. For example, the iPhone 5c, which starts at $99 with a service plan and is available in a choice of colors, could appeal to younger people attracted in part by the relatively low price. The result could be that a flurry of employees buy the phones on their own and bring them to work under bring-your-own-device (BYOD) arrangements — and then expect IT to have the workplace Wi-Fi ready for them.

Enterprise IT may welcome some of the hardware features in the new phones — notably the Touch ID fingerprint sensor in the iPhone 5s, which could simplify the phone unlocking process.

Touch ID isn't available in the iPhone 5c, but that device's low price "could potentially make it easier for Apple to increase uptake in the enterprise," said Carolina Milanesi, an analyst at Gartner. She noted that "most enterprises are still relying on BYOD or allowing employees to pick an iPhone from a list of devices, but then asking them to pay the difference between what an average enterprise device would cost and the cost of the iPhone." ◆

iOS 7 will have a high impact for enterprise IT leaders in terms of security and management.

REUTERS / STEPHEN LAM



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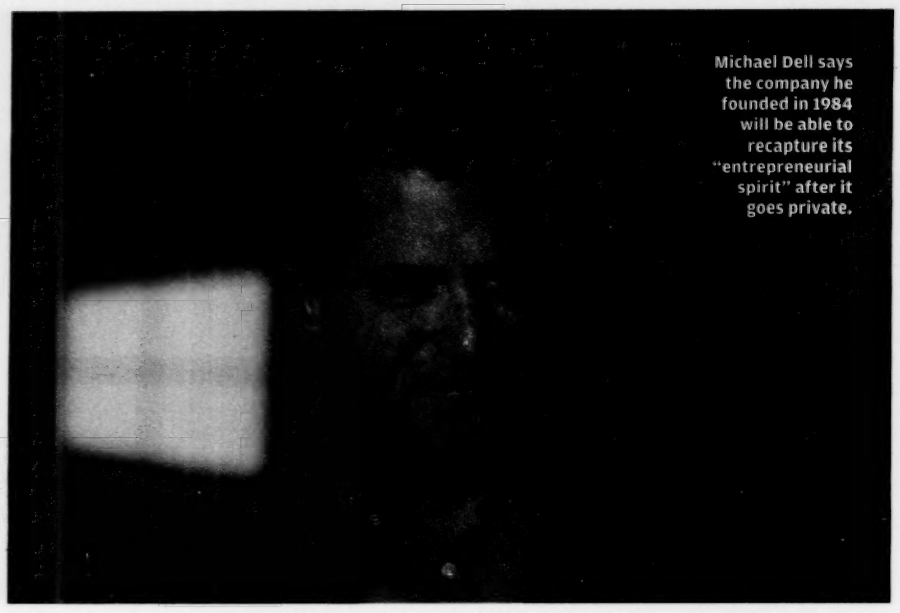

Michael Dell says the company he founded in 1984 will be able to recapture its "entrepreneurial spirit" after it goes private.

New Dell Won't Abandon the PC

Post buyout, the company can push into the high-margin products and services business without Wall Street meddling, Michael Dell says. By Chris Kanaracus and Agam Shah

DELL WILL CONTINUE MAKING ACQUISITIONS and will remain committed to its struggling PC business once its $24.9 billion deal to go private is complete, according to company officials.

The long, twice-delayed purchase of Dell by CEO Michael Dell and investment firm Silver Lake Partners was finally approved by shareholders earlier this month. Once the deal closes, likely by Nov. 1, Michael Dell will hold a 75% stake in the company he founded in 1984.

As a private company, Dell will be able to recapture the "entrepreneurial spirit" of its early days and more effectively execute a strategy of moving heavily into the high-margin products and services business without pressure from Wall Street, Michael Dell said.

Dell's post-buyout plan emulates the strategies of publicly held companies like IBM, Hewlett-Packard and Oracle, which package software, hardware and services into integrated offerings.

The new owners also plan to invest heavily in research and development, expand the sales staff, broaden the scope of partner programs and expand the company's presence in emerging markets, according to Michael Dell.

But company officials also vow that the personal computer will remain a core part of the business, dismissing reports in recent years that Dell was planning to exit the market where it got its start.

"We will continue to make large investments in R&D in enterprise solutions and services," said Chief Financial Officer Brian Gladden, but then quickly added, "By no means is that a statement of our lack of commitment to the PC business."

It's not clear whether the company must significantly cut costs to pay for those investments — and Gladden didn't offer many specifics, saying only, "We balance the need for productivity in our business."

While Dell officials repeatedly affirmed the outline of their post-buyout strategy, Forrester Research analyst David Johnson said he still expects some changes over the next few months.

"Software is going to form a much more important part of Dell's business in the future," Johnson said. "Dell is in a position right now to be able to blend a really good hardware business with good enterprise traction with a growing software business, and build new types of converged systems."

Dell's software strategy will likely focus on areas such as virtual computing and applications for healthcare, he added.

Other areas of focus likely include high-end computing and converged systems that would run ERP and CRM software from vendors such as SAP and Oracle, Johnson suggested. He said it would be risky for Dell to buy a major business software vendor. "They don't have the core expertise in running enterprise application software business," he said. "You can't just acquire that."

Jeff Kaplan, an analyst at ThinkStrategies, said the vote to go private "puts a lot of the uncertainty behind the company" and places Dell on firm footing to pursue its strategy.

The uncertainty has been driving potential customers away, Kaplan said. "We've seen a dramatic decline in demand for Dell's services," he said. "The sooner they can pursue that strategy, the better opportunity they have to succeed." ◆

Kanaracus *and* **Shah** *are reporters for the IDG News Service.*

> Software is going to form a **much more important part** of Dell's business in the future.

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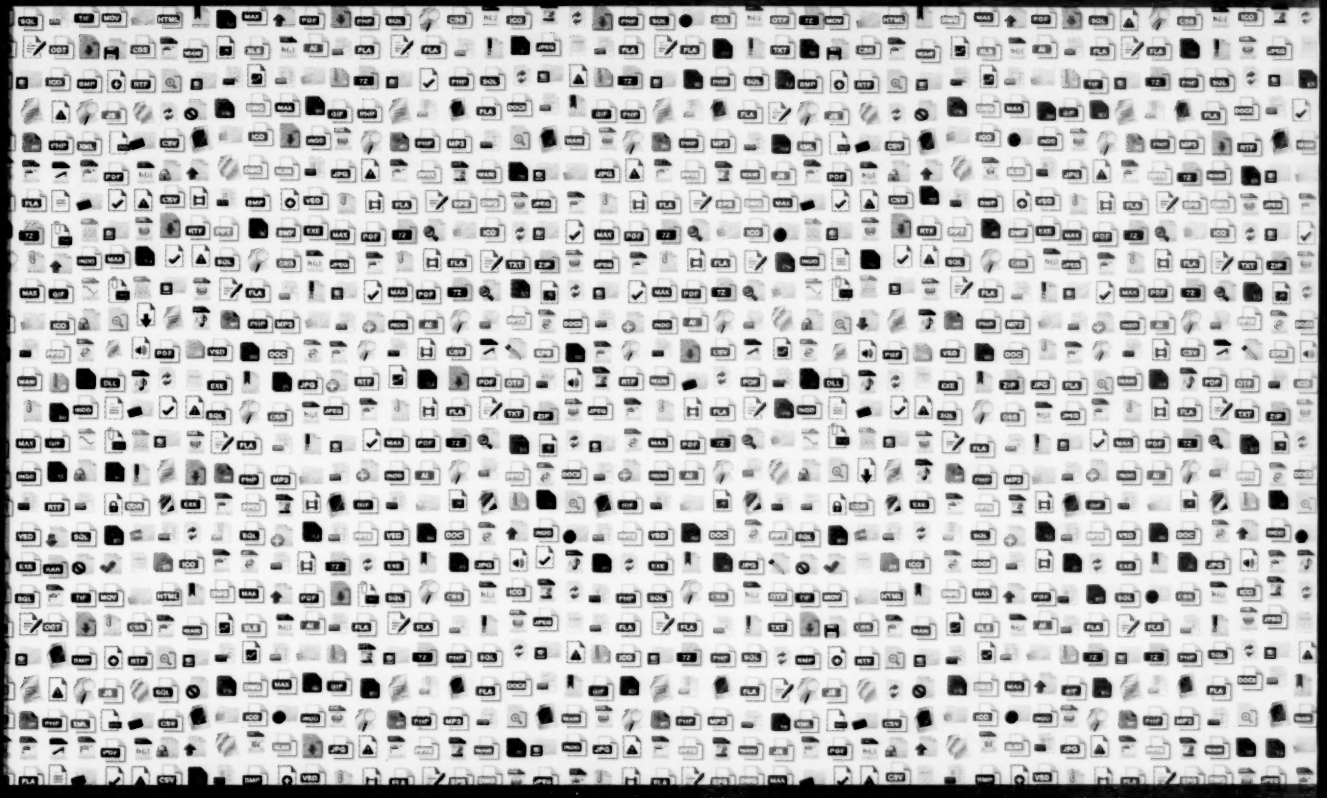

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THE Grill

Ajay Waghray

Stepping into a new role, this IT leader tackled a massive project to streamline infrastructure.

Family: Wife and two daughters.

What's on your playlist? Classical and classic rock. "It's both extremes. It's a strange mix."

Personal pursuits: Traveling and hiking with his family. Recent vacation spots include Hawaii and Turkey, where he and his family took a balloon ride.

What are you reading these days? Dan Brown's *Inferno*.

Where's your hometown? "I grew up in Hyderabad, India, but Basking Ridge [N.J.] is home now. It's the longest I've been in any particular place."

WHEN AJAY WAGHRAY *stepped into the job of CIO at the newly created Verizon Enterprise Solutions in January 2012, he encountered an array of systems that couldn't talk to each other or work together. Recognizing the disparate collection as a barrier to growth, Waghray focused his IT team on consolidating and updating the infrastructure and eliminating redundant systems to create the streamlined backbone that he wanted. His other duties include leading the global IT strategy and initiatives at Verizon Enterprise Solutions, which focuses on serving business and government agencies. Here he talks about some of his most recent work.*

What was the biggest challenge you faced when you started as CIO? We had a wide array of disparate systems that was a result of all the acquisi-

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tions over the years that culminated in the creation of Verizon Enterprise Solutions. We had hundreds of systems and thousands of interfaces. When you have too many systems, too many environments, too many ways of servicing the customer and creating solutions, you have an inconsistent one-to-one experience that is very hard to enable and support. You can't scale a business that is majority customized.

To correct the situation, we worked on streamlining the processes underlining those and streamlining the systems, to simplify the experience for our customers and our employees. We removed more than 300 of our systems and streamlined all of those processes with the goal of making it a seamless experience. It eliminated this fragmented experience, the inconsistencies, long delivery times and the costs to maintain it.

How did you approach fixing such a complex problem? We sat down with all our cross-business partners to strategically align with where we were heading and how we would achieve our goals. Then we started to focus on the people: What is the most streamlined process for both our customer people and our employee people, to enable the best experience? That created really the basis for what I call the "one function/one process/one system" approach to determine our end-state architecture. We have a multiyear road map and we're making progress ahead of schedule.

You wrote about companies looking to CIOs to "unlock the potential of their organizations through technology." How do you approach this? The model I use is what I call OCI. It's worked for me in unlocking this. The O is for *optimization*, which is essentially less is more. [We focus on] streamlining and optimizing everything we do. Then C stands for *consistency*, which is really about standard, efficient processes and systems that drive consistent customer experiences at every touch point and embodies the "one function/one process/one system" approach. And the I stands for *innovation*, which is really enabling the future of our business by enabling new products and services and new business process innovation. In our context, we are focusing on the business opportunities and opportunities in other areas, such as cloud and big data and innovative ways to combine these things. That truly creates a foundation for our initiatives.

How do you balance the need for IT to provide both optimization and innovation? They're not exclusive in any ways. It's about having the discipline to make things simple and free yourself to tackle bigger questions on how to change the game.

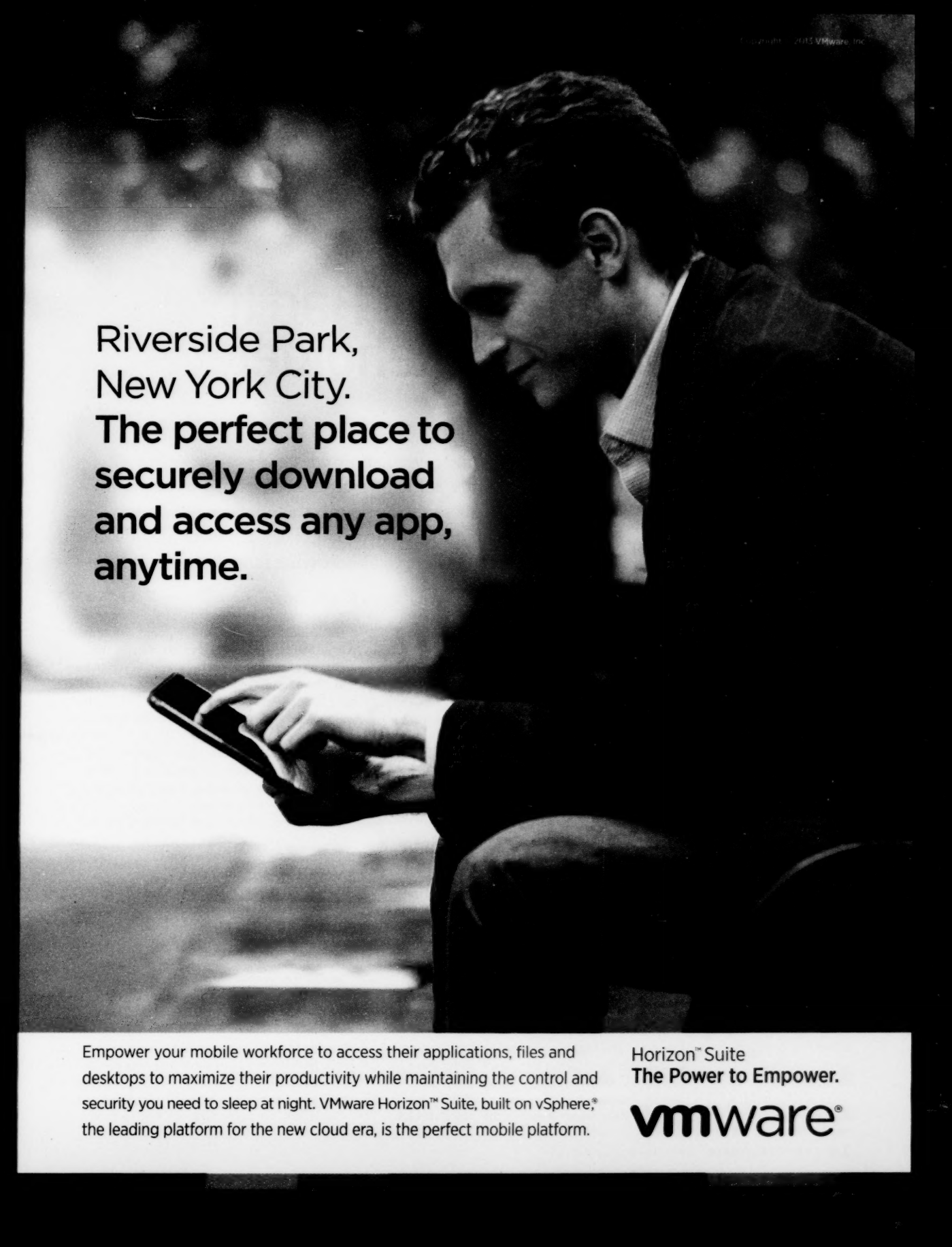
As CIO of a fairly new organization, how would you describe the IT culture you're building? It's a culture of performance and ownership. It's there every single time you have a dialogue — you say, "You touch it, you own it." You talk about producing measurable results, so if you can't measure it, you don't do it. It's about producing measurable business value. That's instilled into all the performance agreements, all the day in and day out projects, all the project reviews. It all has that orientation.

Can you talk about your IT Next program? It is an IT transformation program. My general stance is that innovation and transformation is everyone's job. There are cross-functional teams created to break walls down and get people talking and give people the opportunity to transform the way we work and to be better tomorrow than we are today. We structure it based on needs and context. We take people's input on what they think is most important for us to focus on as a team.

We just had our first live chat session with all the global teams to really share ideas on what are good ideas of risk-taking, decision-making, accountability and how you can use some of the new technologies for collaboration. Another team is focused on developing and improving existing talent. Another team is lean-and-mean design and development, focusing on data architectures and development techniques. This makes it very contextual and current, and the overarching goal is to make us better business leaders.

What do you look for in your IT team members? The most important thing for me, beyond the technical skills — that's table stakes now — it's really the business orientation. It's about accountability, ownership, performance, innovation, customer orientation, communication, collaboration. Those softer skills are very, very important.

— *Interview by* Computerworld *contributing writer*
Mary K. Pratt *(marykpratt@verizon.net)*



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PAUL GLEN

When You've Had It With a Stakeholder

> Oftentimes, you just have to live with whatever it is you don't like.

EVERY SO OFTEN I find myself at my wit's end with a project stakeholder and just want to give up and stop trying to help him. The frustration of these situations takes a toll. Even now, years later, I get upset thinking about a particular client. Chances are, if you've been in IT for any length of time, you know what I'm talking about.

But what should you do when you reach that point? Pitching a fit is rarely productive. Suppressing your outrage won't make things better either.

What about walking away? We usually don't think of this as a realistic option. Saying "Take this project and shove it!" is more of a fantasy. But sometimes you need to take a stand about the conditions under which you're willing to work — and be ready to hit the road if those conditions aren't met.

Walking out should be rare, though. What do you do when the situation doesn't reach that threshold?

Oftentimes, you just have to live with whatever it is you don't like. That may be the case in situations like these:

- **You just don't like the client.** Personality clashes happen all the time, and you don't get to choose to work only with your favorite people.
- **She makes unreasonable demands** or doesn't know what she wants. Stakeholders usually don't know that their requests are unreasonable. We need to help them see that and figure out what they really need.
- **The client is not appreciative.** It would be nice if all clients explicitly recognized and appreciated all that IT does for them, but it's not required.

You have to handle other situations more forcefully. The common element in the following scenarios is that continuing to work under these conditions usually results in project failure and damages the morale and operations of your team.

- **The stakeholder demands that you do his job for him.** Every so often, it's normal for a stakeholder to lose sight of an appropriate boundary, and a gentle reminder is all that's required. But some people belligerently and persistently insist that anything with a keyboard belongs to IT.
- **She's too disengaged.** Assess what you really need from the stakeholder to make it possible for you to help; if she's unwilling or unable to provide it, back off until she can.
- **Multiple stakeholders can't agree.** If they refuse to accept a common approach, let them work out the politics on their own. Picking sides won't help you or the project.
- **The client exhibits toxic behavior.** When a stakeholder is so toxic that his behavior destroys the morale and productivity of your whole team, you need to protect the team.

When you decide that you need to take a stand, be clear and calm with your sponsor. Here's what you need to do:

- **Be explicit** about what you will and won't be able to do and why.
- **Clarify the conditions** under which you are able to continue working together.

While there's a chance that sparks will fly, you can comfortably stand your ground knowing that your demands are a thoughtful and mature response to the facts of a troubling situation rather than a personal attack. When you do, there's a good chance your stakeholder will be happy to work things out — and if not, you know what you need to do. ◆

Paul Glen, CEO of Leading Geeks, is devoted to clarifying the murky world of human emotion for people who gravitate toward concrete thinking. His newest book is *8 Steps to Restoring Client Trust: A Professional's Guide to Managing Client Conflict*. You can contact him at info@leadinggeeks.com.

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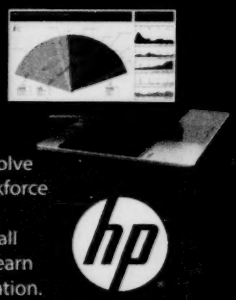

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WRING VALUE *from your* IT Budget

Hosted services will reign in 2014, but IT leaders will be challenged to accomplish everything while still containing costs. **BY STACY COLLETT**

AT FIRST BANKS INC., the name of the game is finding new ways to keep up with the giant financial institutions that have billions of dollars to spend on new products and services.

"We're a midsize bank. We can't keep up with the big guys in terms of their IT spending," says Rick Nolle, CIO at Clayton, Mo.-based First Banks. Even with a 10% to 12% budget increase planned for 2014, "we have to find ways where we can do things differently that give us a boost here and there," he says.

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So about 36% of the bank's 2014 IT budget will be spent on service providers that do everything from hosting its online banking system and providing mobile apps for customers to providing assistance for corporate customers — some 40 apps in all, hosted by a handful of banking-specific vendors. Nolle's team customizes some vendors' "vanilla" apps, or waits for vendors to add new features that the big players already have.

"We try to work between the vendors to innovate — finding ways to connect things together differently that give us a new service, that give us some independence from vendors, that differentiate us from other guys in the market," he explains.

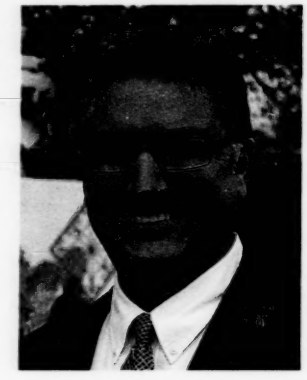
In fact, hosted services have become the bank's focus. "Whenever any kind of replacement need comes up, the first place we're going to look is in the cloud — what can we subscribe to or have somebody put up for us?" Nolle says. The bank has plans for a mortgage loan origination system hosted in the cloud, and possibly a new retail banking system that it will subscribe to via a software-as-a-service model. And both of those will cost less than it currently costs to maintain existing systems.

That's a common theme in 2014 enterprise IT budgeting.

Computerworld's Forecast 2014 survey of 221 IT executives shows that IT budgets are continuing to make a nice recovery. Some 36% of our survey respondents said that they expect an increase in their IT budgets, while half said that their budgets will hold steady. What's more, budgeting for services is outpacing spending on hardware and software, and that has a domino effect on the skills that IT organizations need. While some organizations have cut staff when adding outside help, others have held steady or even added IT staffers because, if an IT organization is buying services, it needs more people with vendor management and negotiation skills.

We're trying to stay at the forefront of the technology, meaning we end up having to replace servers at least two to three times a year. ... I need some better way to do that.

JOHN HAVENER, CIO, TEXAS MULTICORE TECHNOLOGIES



According to Gartner, IT budgets will chug along with small but steady 2.9% average annual increases through 2014.

That doesn't surprise some analysts even though the economy is looking up in many segments. "IT budgets are normally less precocious than the economy," says Gartner analyst John Lovelock. "We have longer purchasing cycles. We can [cut spending] relatively quickly, but the inverse isn't always true."

Computerworld's survey showed a slightly higher average IT budget increase of 4.4% for 2014. And Forrester Research is even more optimistic, predicting that U.S. IT budgets will increase 6.7% in 2014, with spending on software, the cloud and analytics rising and hardware expenditures falling. Forrester analyst Andrew Bartels says his firm based its outlook on expectations that the U.S. economy will improve in 2014, exports to China, India and Europe will increase, and many companies will be itching to buy new technologies.

"Cloud, mobile, smart technologies are all very desirable, and we're finding that as companies are prioritizing those — and as the economy improves — they'll have more room to spend on that," Bartels says.

But while IT budgets are growing, and goals center around improving service levels, productivity and customer satisfaction, containing costs is still the No. 1 business priority for 65% of *Computerworld*'s survey respondents, and about a quarter of survey takers cite budget constraints as the biggest leadership challenge.

As always, the pressure is on for IT to do more.

The Big Squeeze

These days, IT is being squeezed from all directions. Two years ago, Texas A&M University-Kingsville underwent massive spending cuts that slashed its IT budget by almost 22%. But with the eco-

Where Will IT Dollars Go?

IT budgets in 2015 and beyond may bear little resemblance to the budgets of 2014. In fact, Gartner analyst John Lovelock reports that his firm predicts that IT departments won't be in charge of deciding how to spend the majority of the "interesting dollars." That money will be spent within lines of business — and IT will be left to deal with the implications.

"CIOs in many cases are ceding control of [mobile technology deployments], at least in the early stages, to other departments," he says. "In hospitals, it wasn't the CIO who said, 'Let's get tablets for doctors.' It was doctors who said, 'We have tablets and we want to use them.'

"It wasn't the CIO who said, 'We want voice recognition for radiologists.' It was radiologists who got it and forced it on the CIO. It's not the insurance companies that put information out on cellphones, it was the adjustors who were in the field," says Lovelock.

At some companies, decisions about bring-your-own-device policies have already been taken over by HR departments. And overall, more and more dollars are being taken out of the CIOs' hands, to be spent by others.

A cascade of IT requirements inevitably follows. "The CIO in some cases is scrambling and saying, 'I didn't recognize there would be this much demand on my network and this much demand on my storage, or this much need for processing power or these security risks,'" says Lovelock. "So they'll start to play catch-up."

— STACY COLLETT

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nomic downturn also came 25% enrollment growth, which often happens when unemployed people decide to learn new skills.

"Now our departments are looking to us for how to handle the increase when they [also] have less staff," says Robert Paulson, CIO and associate vice president of technology. But with the university's IT budget rising only 3% in 2014, "it puts more demands on technology and using technology wisely," he adds. "Now we're looking at long-range budgets, and it seems very difficult to get that IT money back."

To help out the 30-person IT staff, almost a quarter of the $4 million IT budget will go toward hosted systems, managed services, and consultants and consulting services.

While hosted services certainly help with staffing, Paulson has little evidence that they save money. "We're doing it for the skills and the personnel we don't have. That is what I've seen at other places, too," he says. "We're looking at augmentation — somebody to come in and help us get to where we need to be."

Indeed, IT departments that use services report that, more than saving money, the approach frees up people for mission-critical work, fills skills gaps and improves efficiency. Whether IT can better meet their goals by shifting to more managed services remains to be seen, but survey takers are certainly giving it a try.

"Until now, we were more of a 'do it all — we build it all ourselves' organization," says Bharat Amin, business technology officer at BAE Systems in Arlington, Va. "Now we are putting more emphasis on 'we can't do it all.' We may have to buy things and selectively outsource, and we may have to buy services."

The lingering impact of the U.S. government's budget sequester has left the defense, aerospace and security firm's 2014 budget plan up in the air. "The general outlook for 2014 is the same as this year, maybe a slight reduction because we're not sure of the effect of sequestration," Amin says.

The deficit-reduction measures required by the 2011 Budget Control Act mandate two rounds of cuts, each averaging about $50 billion per year through 2021. The White House has submitted a fiscal 2014 defense request that complies with the first round but not the second. In July, U.S. Defense Secretary Chuck Hagel wrote a letter to Congress requesting relief from the additional $50 billion in cuts — arguing that the scale and abruptness of the reductions would damage the nation's defenses.

1	Security technologies
2	Cloud computing
3	Virtualization
4	Wireless/mobile
5	Business analytics

1	Hardware
2	On-premises software
3	Data center consolidation/optimization
4	IT/network services management
5	Unified communications

Containing costs	65%
Optimizing and automating business processes	55%
Optimizing existing investments	48%
Accelerating business process and agility	45%
Improving collaboration with business	34%

Budget constraints/ economic pressures	26%
Managing expectations/ business alignment	14%
Security	11%
Managing projects	10%
Managing personnel	7%
Improving the customer experience	7%

Congress could make a decision by the end of the year, "but not having that visibility, we have to play all the scenarios. We're keeping our Plan B ready," says Amin.

Plan B involves saving money by using more hosted services. For example, BAE could cut its spending on office productivity tools in half by moving to Office 365, Microsoft's cloud-based version of Office and SharePoint.

"Our business is challenged to become more cost-competitive because as [sales decline] and new opportunities are shrinking — either you're stealing [customers] from someone else or you have to be very cost-competitive to win new business," Amin says.

Spending on hosted services will account for about one-third of next year's IT budget at Texas Multicore Technologies in Austin. The three-year-old maker of multicore programming tools uses SaaS-based systems for human resources, accounting and customer relationship management. The majority of its servers are also hosted at providers' data centers.

CIO John Havener says using services doesn't really cut costs, but it does improve efficiency. "I think [the cost of hosted services is] pretty close to the same as what we'd invest if I capitalized the hardware [cost]," he says. "We're trying to stay at the forefront of the technology, meaning we end up having to replace servers at least two to three times a year — and that build-out time is pretty significant for my IT staff. I need some better way to do that."

With hosted data centers, "we can define the process and hand it off to one of those service providers and they can get it prepped to a degree that it minimizes our time doing the configuring on our side," says Havener.

Wireless Budgets Up

The surge in use of mobile devices has turned connectivity in general and wireless upgrades in particular into IT budget priorities, with funds earmarked for RFID, remote access, Wi-Fi, mobile/wireless devices and mobile device management, among other things.

At Texas A&M Kingsville, wireless networking will receive the largest share of the university's 2014 IT budget. "Our version of wireless is probably five years old, and nobody has thought about all these wireless devices, just laptops," Paulson says. "Now there's a huge demand for more wireless. No more access

points just at the corners of the building. Now you have to cover everywhere."

Havener plans to deploy a mobile device management (MDM) system at Texas Multicore in 2014 to handle bring-your-own-device traffic from its 108 staffers across the globe.

"I've got a variety of developers, engineers and scientists worldwide who are looking for the easiest way to connect to our internal resources," he says. "I've got folks through academia who are very Apple-based, and there are the engineers who are heavily biased toward Linux environments or mainframe supercomputing, and then a bunch of business and marketing folks focused on classic Windows. So [an MDM system] would provide a seamless transition for all those folks to attach to our resources and get out of it what they need. It will define what we provide, how we provide it and what they need to do to access it."

The budget isn't budging next year at the Bridgeport, Conn., public school system. Still, CIO David Andrade will spend 30% of his 2014 IT budget on upgrading network connections and increasing Wi-Fi capabilities in 39 buildings.

"We have 100Mbps switches in our buildings, and we need to upgrade those to gigabit switches to increase the bandwidth," Andrade explains. "We have some Wi-Fi coverage but are adding thousands of mobile devices and need to add access points and bandwidth" to accommodate more than 15,000 desktops, laptops, Chromebooks and other wireless devices.

Gartner also expects to see a huge uptick in network equipment replacements. The equipment that was purchased and installed even a year ago can't handle the growth in mobile data, Lovelock says. Further down the road, the growth in mobile usage will have a "'trickle effect' — do I have enough servers, storage, bandwidth, applications and security to handle mobile?" Lovelock says.

Big Data Still a Big Deal

Business analytics are also on the shortlist of top IT purchase plans for 2014. Spending priorities include big data, enterprise analytics, data mining and business intelligence tools.

Investments in big data technology like Hadoop and MapReduce will command 45% to 60% of the IT budget at Texas Multicore. "It's a solution that we really haven't exploited yet, and we see tremendous potential in that environment," says Havener. "So adjusting technologies and taking advantage of what it can provide will be significant. We're also very aware that it's limited in its capabilities. A lot of folks talk about how slow and how challenging it is to do a Hadoop query. But we can speed that up through in-memory and some development capabilities that we have in-house on the order of six to 12 times faster than standard Hadoop. So we see a great opportunity there."

Rounding out the top five technology purchases for 2014 are virtualization of desktops, servers, storage, networks and mobile systems, and security technologies, such as access control, intrusion prevention, malware protection and identity management tools.

While *Computerworld* survey takers say they will spend less on storage in 2014, Gartner predicts that storage sales will actually increase with the explosion of mobile data, big data and new types of digital files. Although the price of storage is coming down, Lovelock says, spending on storage is going up.

"Storage has one of the highest growths we're seeing across the board, at 7% growth," Lovelock says. "You can say it's just about big data, but the fact is there is a lot of data collection and duplication going on." In the healthcare industry, for example, new digital radiology and digital pathology technologies both generate data that require additional storage.

Yet the best-laid plans can always be ruined. While companies would like to firm up their 2014 budgets, there are a number of political and economic issues yet to play out this year that could impact next year's spending plans, says Forrester's Bartels.

For starters, if Congress delays raising the federal debt ceiling, "that could take a lot of wind out of sails in 2014. We're not predicting that, but we can't rule it out," he says.

There are also lingering concerns about the European economy and worries that China's economic slowdown may continue. "Those are things we [at Forrester] worry about," Bartels says. "But if cooler and wiser heads can deal with it, they won't happen."

In the meantime, IT leaders must plan for the unexpected. That's what Havener does at Texas Multicore. "I maintain a 20% to 25% discretionary pool to deal with those issues that will come up," he says. "[It's] great if you've got that luxury." ◆

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WHAT WILL BE CUT IN 2014?

With the rise in SaaS and platform as a service, it's no surprise that hardware, on-premises software and data center optimization are among the five lowest IT budget priorities for next year, according to *Computerworld*'s 2014 Forecast Survey.

For example, the Bridgeport, Conn., public school system will replace Microsoft Office with Google Apps for Education, which is free, for all staff and students. "Students have never had email, and now [they will]," says CIO David Andrade. Moreover, they "will have their own data storage – saving space on our networks," he adds. "They can also share and collaborate on their work with this."

Rounding out the bottom five spending priorities are network services management and unified communications, such as email, videoconferencing and telephony.

First Banks, for example, will retire 140 PBX phone switches and replace them with an enterprisewide VoIP system. "Our voice costs are going to go down by probably a million bucks," says CIO Rick Nolle. "Some of it will be savings and some of it will be reinvested in other things."

The bank also plans to spend less on networking. "The WAN connection cost is an area where we keep getting more . . . bandwidth and services for less bottom line," says Nolle.

– STACY COLLETT

BOOST *your* Mobile Bandwidth

Wireless networks rule, but wired systems will still have an important place in the hierarchy in the coming year. BY SANDRA GITTLEN

WHEN Robert Howard first took over as CIO at Armstrong Atlantic State University in Savannah, Ga., last year, there was little doubt of his mandate.

"Wireless connectivity and general bandwidth issues were a point of concern among students," Howard says. And that concern was warranted — the university's bring-your-own-device policy had sparked a 250% increase in the number of devices attaching to the network in the previous 12 months.

Wireless access points, core switches, network pipes and Internet connections all had become choke points, according to Howard. The network simply had to be unclogged because the university used mobile access to attract students, faculty and staff, and because it had plans to shift key applications — including its email, ERP and learning management systems — to the cloud to save money and foster business continuity.

The Armstrong team couldn't continue with stopgap measures such as adding new access points whenever the switches and pipes behind them were at capacity. "We had to stop trying to do the math to make the old network work and start at architectural ground zero on a new one. Unless we removed the bottlenecks, [the university's mission] was going to suffer," Howard says.

Howard's realization is not uncommon among IT executives who have watched the demands of mobile devices and cloud computing mercilessly hammer their wireless and wired networks.

In *Computerworld*'s Forecast 2014 survey of 221 IT executives, more than half, 54%, of the respondents said that they anticipate allowing employees to use more consumer technologies at work. And perhaps as a direct result, 53% said that they anticipate needing to add bandwidth to keep pace with the burgeoning use of both mobile devices and cloud-based systems.

"Users are increasingly dependent on network infrastructure — cloud, mobility and social platforms are touching all areas of the enterprise," says Sanchit Vir Gogia, chief analyst and group CEO at Greyhound Research. "If the network becomes the choke point, then it will have an impact on the user experience and IT will be blamed." He adds that IT has to develop metrics around wireless and wired access that must measure any drop in perfor-

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mance and the overall impact on user experience.

Among Armstrong's nearly 7,400 undergraduate and graduate students and almost 600 faculty and staff members, Howard says he has seen a rise in individuals using not just single devices, but combinations of smartphones, tablets, laptops and, in the residence halls, gaming stations.

So for six months, starting during the school year late last year, Howard and his team set about ripping and replacing all elements of the wireless and wired LAN, as well as the pipes between buildings and out to the Internet. He says, only half-jokingly, that because school was in session, it was like being a magician who pulls the tablecloth off of a table without upsetting the dinner plates.

One of the team's first initiatives was to increase the coverage and density of the wireless LAN. The 802.11 a/b/g access points had been clustered so much that they were starting to experience diminishing returns, suffering interference and other scaling issues.

The new wireless LAN has to serve students equally well indoors and out. The IT team upgraded to 802.11n access points, which are capable of supporting 30 to 40 clients each, compared with 20 to 30 for the old access points, and installed 60% more access points campuswide — eliminating the access point bottlenecks in a single stroke.

The move also cut maintenance costs by 30%. "As the national conversation plays out about college affordability, this matters greatly by helping us maintain affordable tuition," Howard says.

Next, the Armstrong team focused on the network switches and pipes between buildings, bumping them from 100Mbps to 1Gbps to handle the increased traffic from the new wireless access points.

Expecting demand to continue its current trajectory, IT built in enough headroom in on-premises gear and with the school's Internet service to support demand for the next three to five years. "We're not at 10Gbps levels yet, but we could get there and we are ready," Howard says.

In addition, IT is evaluating 802.11ac access points, which boast gigabit speeds for wireless connections, as an option for the next three-year refresh.

Opening the floodgates on the pipes is one part of Howard's road map; the other is using caching to reduce back-and-forth traffic. For instance, caching would be a big help with Microsoft's Patch Tuesday, which can strain the network as each device tries to download software patches and updates. Instead of clogging the Internet connection, users could grab what they need from a cache on local servers.

At the same time, the university is committed to moving as many administrative and student services to the cloud as possible, including the main ERP and student management systems.

Mobile and cloud computing often are the first interaction points that prospective students, faculty and staff have with the university. "Access drives enrollment, research funding and graduation rates. Being able to easily access applications from a 4-inch device and/or the cloud gives us a competitive advantage," Howard says.

> **We had to stop trying to do the math to make the old network work and start at architectural ground zero on a new one. Unless we removed the bottlenecks, [the university's mission] was going to suffer.**
>
> **ROBERT HOWARD,** CIO, ARMSTRONG ATLANTIC STATE UNIVERSITY

Targeting Wireless

While Armstrong focused on providing as much wireless access as possible, Chicago's Advocate Health Care is trying to improve wireless access for specific needs, says Gary Horn, CTO and vice president of technical services.

Advocate Health Care, which provides medical care at 250 sites, including 10 acute-care hospitals and two integrated children's hospitals, initially deployed 802.11 a/g/n access points throughout its facilities and untethered a host of traditionally wired devices such as floor workstations. Over time, though, the IT team observed interference among the growing access point clusters and wireless access bottlenecks became a concern.

"There has been an exponential growth in the use of wireless in healthcare overall — everything is wireless whether it needs to be or not," Horn says. "Yet we haven't cracked the wireless bandwidth nut — rarely do you attain the speed and performance users need, even if they are close to the access point."

Eric Hanselman, an analyst at 451 Research, agrees. Users expect the same computing experience they get at home, he says. Yet as data goes mobile and heads out to the cloud, that response time may slow down.

In addition, organizations assume that a swap to the cloud is simple but don't always consider the bandwidth needed for the back-and-forth data movement. "Every CIO's nightmare is the complaint that bandwidth access to a particular application is faster from my home network versus the enterprise," Hanselman says.

Such expectations are not lost on Horn. With departments such as radiology primed to go mobile, the Advocate Health Care IT team has to tread lightly. "We know that radiology, which needs high-quality resolution and performance, will be a tremendous consumer of wireless bandwidth — maybe even its No. 1 consumer," Horn says. A wired workstation with a 1Gbps interface lets users access an image such as an MRI in two to three seconds. "That same image could take a minute or two over the wireless network," he explains.

Also, he worries about the quality of images transmitted wire-

LOOK BEFORE YOU LEAP

Eric Hanselman, an analyst at 451 Research, says bandwidth should be a primary consideration for any organization considering a wholesale move to the cloud. "It can be tempting to take all core applications and key databases and run them in a cloud environment," he says, but if you don't have high-powered wireless access, high-capacity connectivity and secondary circuits, you'll likely face problems that can critically affect your operations.

Sanchit Vir Gogia, chief analyst and group CEO at Greyhound Research, offers similar warnings about throwing everything on the wireless network. "Wireless is not always the solution," he says. Companies should study usage and then develop an intelligent strategy. For instance, they can segment their networks by categories of users and by type of traffic, which might alleviate bandwidth strain to not only their wireless access points but also their core switches.

The Weber County, Utah, government did just that. Information security officer Matt Mortensen worried that allowing employees to freely use the county's network would eat up bandwidth and jeopardize security. But he had to meet the demands of the county's 1,200 users, half of whom increasingly wanted wireless access for their personal devices.

Mortensen uses firewalls to split the network into separate segments for private and public use. The firewalls are also capable of blocking or throttling bandwidth for productivity-draining applications such as streaming video. While that approach is working today, Mortensen says he fully expects to revisit his strategies as video platforms become integrated into county workflow and more users come onto the public network wanting to do more with their devices.

Gogia says applying intelligence to bandwidth use could buy an organization enough headroom to ward off the need for a major increase. One example of intelligent bandwidth management, he says, is scanning each packet of network traffic to help determine which applications and users require more resources. That approach helps IT maintain more granular control. ■

— SANDRA GITTLEN

"Wireless has so many practical limitations that we're very careful to [make sure] we don't bring about expectations that aren't attainable."

GARY HORN, CTO AND VICE PRESIDENT OF TECHNICAL SERVICES, ADVOCATE HEALTH CARE

lessly. With today's technology, "it would be hard to get the image in and buffered quickly," Horn says. Before moving forward, he would put wireless networks to the test to ensure that the performance is good and the images are high quality.

"Wireless has so many practical limitations that we're very careful to [make sure] we don't bring about expectations that aren't attainable," he says.

To maintain access point density and coverage, and keep bandwidth capacity at a workable level wherever possible, Horn has opted to keep some devices on the wired network. "We still look at the wired opportunity — even with new construction," he says. "If an employee is typically going to be standing in the same area to do their task, then we put them on the wired network."

He has been studying the potential of 802.11ac but doesn't see it as a panacea for what ails most wireless networks today. He claims the dual band (2.4GHz and 5GHz) could present engineering challenges and keep it from reaching its 1Gbps theoretical data rate. "If we install it into a real network with competing interference, that will de-rate the speed and not make it worth implementation costs," he says. That said, as Advocate constructs new buildings, Horn is planning cabling to support 802.11ac for potential future adoption.

In addition to access point frustrations, Horn has experienced Internet connectivity strains and network security requirements that forced him to separate public and clinical Wi-Fi traffic, and to bump up capacity.

For instance, Horn assigns public traffic — which can be generated by patients or family members streaming video and other bandwidth-intensive applications — a lower class of service than he does the mission-critical hospital traffic. At the same time, he asked his Internet service provider to expand the Internet pipe from 100Mbps to 500Mbps with headroom to hit 1Gbps, which he expects to need within the year. He credits lower prices from ISPs for making this option possible.

BYOT = Bandwidth Vampire

Horn may currently have the luxury of restricting wireless installations, but Bailey Mitchell, chief information and technology officer at Forsyth County Schools in Cumming, Ga., doesn't.

The school district, which has 36 schools, has publicly announced that it is committed to a "bring your own technology" (BYOT) program. One of the top strategic goals for the next three years is to leverage student-owned technology to redefine the district's technology platform.

Computer labs for middle and high schools are coming back into play with increased online testing requirements, and all the schools need more wireless capacity. "We try to keep up,

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but readily admit it has been difficult with more limited budget resources and the lack of regular upgrades needed because of the overall situation many school systems continue to grapple with," Mitchell says.

The initial demand for Internet access actually caused an alarming connectivity dearth. "Four years ago, we ran low on much-needed bandwidth for Internet-based resources — it really snuck up on us. We realized we had no quick fix and ended up throttling some services and vowed to never have that happen again," Mitchell says.

The situation resulted in an end-to-end revamp of the district's network. To start, Mitchell and his team studied the uptick in usage. Last year, Forsyth's BYOT program grew 80%. Where once IT had expected to need bandwidth for 6,000 to 7,000 devices, suddenly an average of 24,000 devices were knocking at the network door. "We only have 41,000 students, so almost half were bringing their devices," he says.

More importantly, participation stretched across all schools, meaning the access points, network switches, pipes between buildings and Internet connectivity had to be at the ready.

Teachers, students and administrators depend on access to internal and cloud-based resources, including email, a learning management system and supplementary educational programs that can include bandwidth-intense video.

Usage is so prevalent now that the district changed its policy from acceptable use to responsible use because typical "banned" applications such as YouTube are now considered necessary learning platforms. "With resources like YouTube blocked, we were taking away a lot of desirable instructional options. However, allowing them does bump up bandwidth usage," Mitchell says.

Once IT had a firm grasp on usage, it upgraded access points to 802.11n. In re-evaluating coverage, the team determined they needed 15% more access points throughout the district. The district plans to double the capacity of wireless networks in all schools by the spring of 2015.

Coverage and density remain constant bugaboos. For instance, IT initially determined the front office, which is populated by desk workers, didn't need an access point. However, principals and other staffers did need to use mobile devices, so IT had to install a small access point array. Also, users regularly call the help desk to report dead zones, and delivering service to those areas requires the relocation, reconfiguration or addition of access points.

Mitchell's next project is to replace districtwide LANs to support eventual gigabit connectivity. "You have to make sure you're not building out a wireless infrastructure that passes traffic to a network core that wasn't designed to handle the load," he says.

He is less concerned about the pipes between buildings — there are two 1Gbps connections from multiple providers — and Internet connectivity, which he boosted to three circuits, again from multiple providers, after the outage. "We have created a fully meshed network that can support disaster recovery," he says. Everyone is excited about being wireless pioneers, but they have no tolerance of downtime. "It gets ugly if we have outages," Mitchell says.

Though there is talk of building an all-wireless infrastructure, Mitchell is skeptical. "We build these schools with so much concrete and steel, you'd have issues where the signal won't bounce around and penetrate like you'd need it to. Also, in any K-12 educational environment, you still need a wired network that is safe and secure and ensures that sensitive student information is kept in-house, he says.

He has also learned that boosting bandwidth and swapping out hardware and software requires a review of the applications that use the network. For one, developers have to be cognizant of the responsive design they use for mobile or cloud applications, taking into consideration, among other factors, bandwidth constraints.

Mitchell advises his peers to focus on the mission and not the minutiae, which can become overwhelming. "Our goal is to accelerate our transition to a completely digital learning environment for students," he says. "And for that, IT has to be ready with a scalable wireless and wired solution." ■

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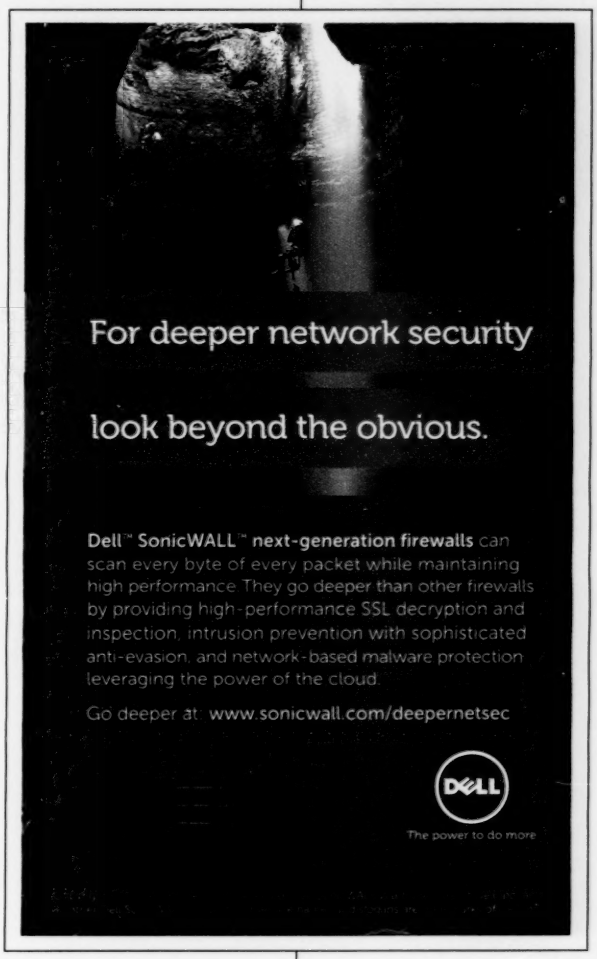
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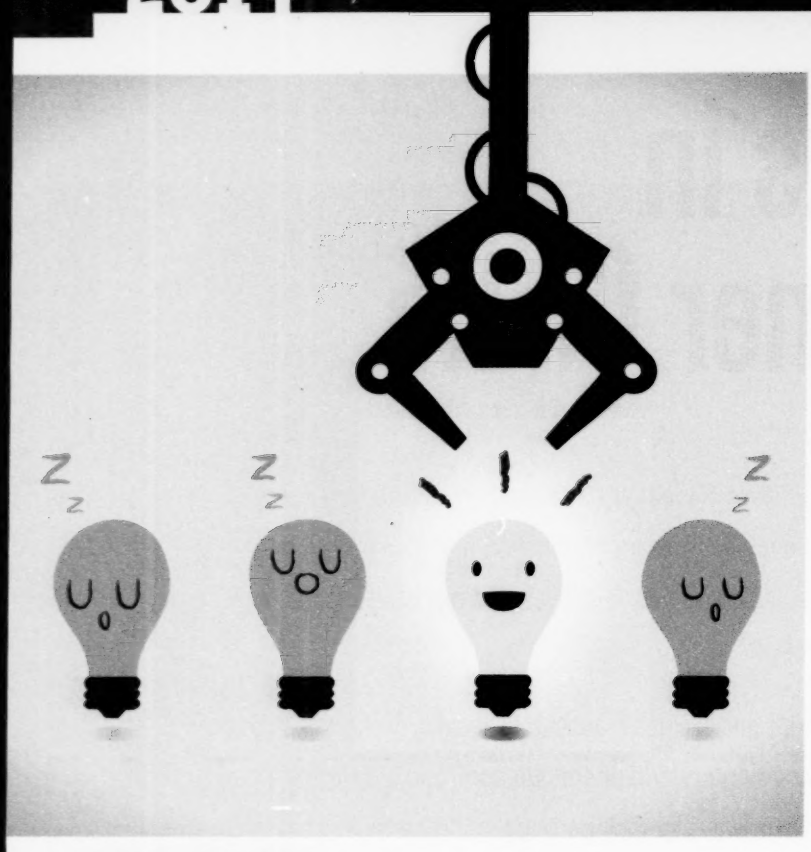

NAB *the* Hottest IT Skills

Help desk staffers are coveted, but developers are the hottest commodity of all. **BY MARY BRANDEL**

WHEN IT COMES to overall job prospects for IT professionals, 2014 will look a lot like this year, with 32% of companies expecting to increase head count in their IT shops, compared with 33% in 2013, according to *Computerworld*'s annual Forecast survey.

But while demand will remain steady overall, there have been a few changes in the skill sets most desired by hiring managers. Unemployment "is probably close to zero for people with high-demand skill sets," says Michael Kirven, founder and CEO of Mondo, a technology resource provider. Employers in search of top skills, he says, need to be prepared to move fast. "If you want them, you can be 100% sure there are at least two other firms that want them, as well," he says.

Here's a look at the IT skills that will be in demand next year, according to companies with plans to hire IT professionals in 2014.

1 Programming/ application development

- *49% of respondents said that they plan to hire for this skill in the next 12 months.*
- *Last year's ranking: No. 1*

As it did in the 2013 Forecast survey, programming/application development tops the list of hot skills, although just under half of the 221 respondents said they will hire in this area, compared with 60% last year.

Scot Melland, CEO of Dice Holdings, parent of IT jobs website Dice.com, concurs that software developers are the most sought-after technology workers and notes that they enjoy one of the lowest unemployment rates around — just 1.8%, according to the U.S. Bureau of Labor Statistics. It's no wonder, then, that respondents to the *Computerworld* 2014 Forecast survey named developer and programmer job openings as the most difficult to fill. The hottest specialties within that category, Melland says, are mobile development expertise and experience building secure applications.

Carbonite, an online backup service provider, expects to find a tight market for software developers and engineers as it shifts its business model to focus on the needs of small businesses, says Randy Bogue, vice president of talent at the Boston-based company. "While there are a lot of experienced software developers in the Boston area, there are just as many technology companies looking to hire them," he says. "We find this while looking for front-end developers, user experience engineers, mobile developers and pretty much any other software development position."

Lucille Mayer, CIO at BNY Mellon, also expects to have difficulty finding developers. The financial services company has several hundred openings, mainly in New York City and Pittsburgh, and about 40% of those are in development. Another 30% are in infrastructure, 20% are for business analysis/project management positions, and 10% are in management.

"Demand is high for skilled developers with three to five years' experience and a service delivery orientation," says Mayer, who is particularly interested in people with object-oriented development experience. Also important is finding people from diverse backgrounds, with diverse ideas and perspectives, she says.

Hospitality giant Hyatt is transitioning from a reliance on

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third-party service providers and aims to bring more development talent in-house. "We're looking to hire people who embrace agility and speed to move ideas to prototype and production quickly," says Alex Zoghlin, Hyatt's global head of technology.

2 Help desk/technical support

- *37% of respondents said that they plan to hire for this skill in the next 12 months.*
- *Last year's ranking: No. 3*

Help desk/tech support remained near the top of the list, moving up from No. 3 last year. Melland says that's an encouraging sign for the economy and the overall hiring outlook. "Organizations mainly add help desk and tech support when they're adding workers and expanding their technology infrastructure," he says. Also contributing to demand for support technicians is the fact that many companies are bringing the help desk back in-house after outsourcing that function; that's partly a response to the proliferation of mobile devices and company-provided Web services. Because of the complexity of such setups, "it's important for support staff to really understand what the company is doing, which argues for having this function closer to home," Melland says.

After several years of running a lean support function, Wolverine Advanced Materials in Dearborn, Mich., plans to hire a few help desk staffers in response to business growth and a decision to provide ITIL-based service management, says James Bland, network manager at the automotive materials supplier. "There is growth in the company, so we're more confident in hiring," he says.

3 Networking

- *31% of respondents said that they plan to hire for this skill in the next 12 months.*
- *2013 ranking: No. 8*

Demand for networking skills jumped to No. 3 from eighth place last year. This correlates with the results of a recent survey by IT hiring firm Robert Half Technology, in which 55% of the respondents named network administration as the skill set most in demand, along with database management.

The need for wireless connectivity is probably behind the interest in networking professionals, Melland says. "Demand for people with wireless networking experience is up 9% year over year," he says, and the unemployment rate for network and systems administrators is 1.1%.

Charles Whitby, lead network analyst at the Medical Center of Central Georgia, says growing use of wireless medical devices is definitely fueling his workload. In addition to the increased network traffic they produce, those devices require a lot of troubleshooting — as is the case when, for example, their firmware needs upgrading but it hasn't been approved by the Food and Drug Administration, he says.

Meanwhile, at Wolverine, Bland is looking to offload some networking responsibilities so he can concentrate on more strategic issues.

4 Mobile applications and device management

- *27% of respondents said that they plan to hire for this skill in the next 12 months.*
- *Last year's ranking: No. 9*

With mobile devices proliferating in both the corporate and consumer worlds, it's little wonder that mobile skills catapulted toward the top of the list, from No. 9 last year. And because of mobile's relatively new status, it's also not surprising that *Computerworld* survey respondents named mobile expertise the third most difficult skill to find, after development and BI/analytics skills.

Mobile app development is "a huge initiative" at PrimeLending in Dallas, says CIO Tim Elkins, and it will be a key hiring area next year. In addition to expanding its Salesforce.com development ranks, the mortgage provider hopes to hire two or three mobile developers, he says. PrimeLending's first mobile app is designed to enable its business partners — real estate agents and builders — to view loan statuses; its next one will be for consumers.

Elkins anticipates difficulty finding mobile developers and is therefore training a couple of current staffers to fill the need. "Salesforce.com developers are really tough to find because of the high demand, and so are mobile developers," he says.

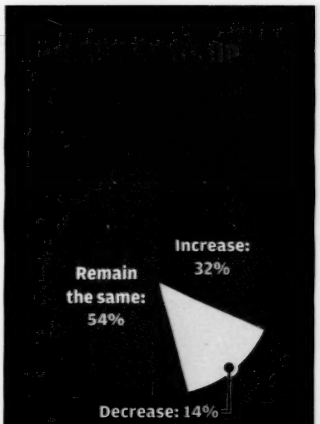
Mobile expertise is also a priority for Hyatt, and Zoghlin says the company is trying to fill niche roles to ensure a consistent strategy across areas like mobility and user experience.

5 Project Management

- *25% of respondents said that they plan to hire for this skill in the next 12 months.*
- *Last year's ranking: No. 2*

While project management fell from its No. 2 position last year, it is considered a highly sought-after skill. Melland says that Dice has found demand for project managers to be second only to demand for software developers/engineers, having risen 11% from last year. That uptick, he says, is another positive sign for the economy as a whole, because it indicates that companies are willing to pursue strategic projects.

Mondo's Kirven attributes the demand for project managers to renewed interest in complex, strategic business-technology initiatives. "IT has historically been graded based on the success or failure of projects, so [companies are] making heavy investments in the business analyst/project manager layer," he says. "These people need to be able to talk to developers about technology and the right solution, but they also need to put on their business hat to gather requirements and prioritize needs and translate that into a programmable effort for IT."



Programming/application development	32%
Business intelligence/ analytics	21%
Mobile applications and device management	17%
Project management	14%
Security	14%
Cloud/SaaS	14%

Base: 71 respondents who expect an increase in IT employee head count in the next 12 months.

6 Database Administration

- *24% of respondents said that they plan to hire for this skill in the next 12 months.*
- *Last year's ranking: Not ranked*

Database administration — which didn't even make last year's list — will be hot in 2014, likely because of interest in big data. Kirven concedes that the term *big data* is a catch-all for everything companies want to do with the burgeoning stockpiles of information they store on internal systems and, increasingly, collect from sources such as social media sites, the Web and third parties. Much of the interest in big data originates in marketing, which wants to learn as much about customers as possible.

"Oracle DBAs, data architects — these people stay on the market for about an hour until they're hired," Kirven says. "People are looking for that person who can build a logical data map of their systems and aggregate relevant data so they can analyze and report on it."

DBAs with experience moving pieces of the IT infrastructure to the cloud will be highly sought after, says Melland, noting that demand for cloud skills is up 32% from last year.

To help kick off PrimeLending's big data initiative, Elkins says he is seeking systems analysts, developers and DBAs to integrate data from third parties, with the goal of easing the mortgage process. "Mortgages have been like a big black hole, with a lack of transparency and a lot of sitting and waiting," Elkins says. "Our focus in 2014 is to give consumers more control and an experience with mortgages that they've never had before."

7 Security Compliance/Governance

- *21% of respondents said that they plan to hire for this skill in the next 12 months.*
- *Last year's ranking: No. 4*

Security expertise seems to show up on every list of hot IT skills, and Melland says interest in cybersecurity will further drive demand, which is up 23% from last year. "It's one of those skills that falls into a lot of job types, like network engineering, software development and database architecture," he says. Respondents to a recent Robert Half Technology survey said security jobs are among the most challenging to fill, in addition to application development and database management positions.

With the increase in malware and cyberattacks, security has become a No. 1 priority for PrimeLending, which doubled its security staff this year, from four to eight people, Elkins says.

8 Business Intelligence/Analytics

- *18% of respondents said that they plan to hire for this skill in the next 12 months.*
- *Last year's ranking: No. 5*

With the volume of global data predicted to expand by a factor of 44 from 2009 to 2020 and reach 35.2 zettabytes, according to IDC, companies are eager to gain a competitive edge by developing sophisticated analytics capabilities. Although BI/analytics is still considered a specialty and therefore has fewer postings than other job categories on Dice.com, Melland says it's the third fastest-growing skill area on the website, and demand is up 100% from last year. Analytics expertise is scarce, ranking second among the most difficult skills to find in the *Computerworld* survey. Accordingly, these professionals command high salaries, often into the six figures, Melland says.

At Wolverine, management's demand for data-driven insights is growing, so Bland is looking for people with BI skills who are also familiar with the Plex Systems ERP application, which the company uses. "We would definitely like to get more information out of [our ERP] system, so someone with BI experience would be great," he says. "We'd like to provide more information in a more timely manner so the business can be more proactive." Hyatt, says Zoghlin, is similarly looking for people "who can make analytics usable and useful for customers and colleagues." ◆

Brandel *is a* Computerworld *contributing writer. You can contact her at marybrandel@verizon.net.*

Looking Beyond Tech Skills

Technology skills aren't the only factor to consider when assessing candidates for IT jobs. Employers should also consider applicants' interpersonal skills to ensure new hires will be effective in the workplace. The two most important characteristics, according to the *Computerworld* Forecast survey, are the ability to collaborate (cited by 66% of the respondents) and the ability to communicate with business users (62%). This comes as no surprise to Scot Melland, CEO of Dice Holdings. "So much technology is being used in every part of the organization that you need people who are good communicators," he says.

James Bland, network manager at Wolverine Advanced Materials, says those are skills he will seek in new hires. "I want to empower our users to know how IT can help them be more efficient and get their job done," he says, and that can happen only when IT helps translate systems capabilities into something the user can put to good use. "You can implement the best systems in the world, but if people don't understand what to do with them, they're useless," Bland says.

Lucille Mayer, CIO at BNY Mellon, says a customer-service mentality is a must. "Our IT department is called Client Technology Solutions, and every one of us has a client customer, whether it be internal or external," she says. "A service orientation and being customer-focused, collaborative and a great communicator is essential."

An important communication skill is speaking the language of various business domains, such as marketing, sales and finance, Melland says. In fact, according to Michael Kirven at Mondo, employers are increasingly seeking people with knowledge of business disciplines in addition to tech skills, whether it's an HTML5 developer who understands the supply chain in retail or a Java developer with experience in financial derivatives trading systems. "Specialization can really drive innovation," he says.

At PrimeLending, it's all about cultural fit. "We hire for culture first," says CIO Tim Elkins. This is particularly true at the leadership level. "If we're going to hire a new manager, it's not just a matter of whether they're a good leader but whether they can adapt to our style," which Elkins calls "servant leadership" — meaning leaders are called to serve, not order people around.

MARY BRANDEL

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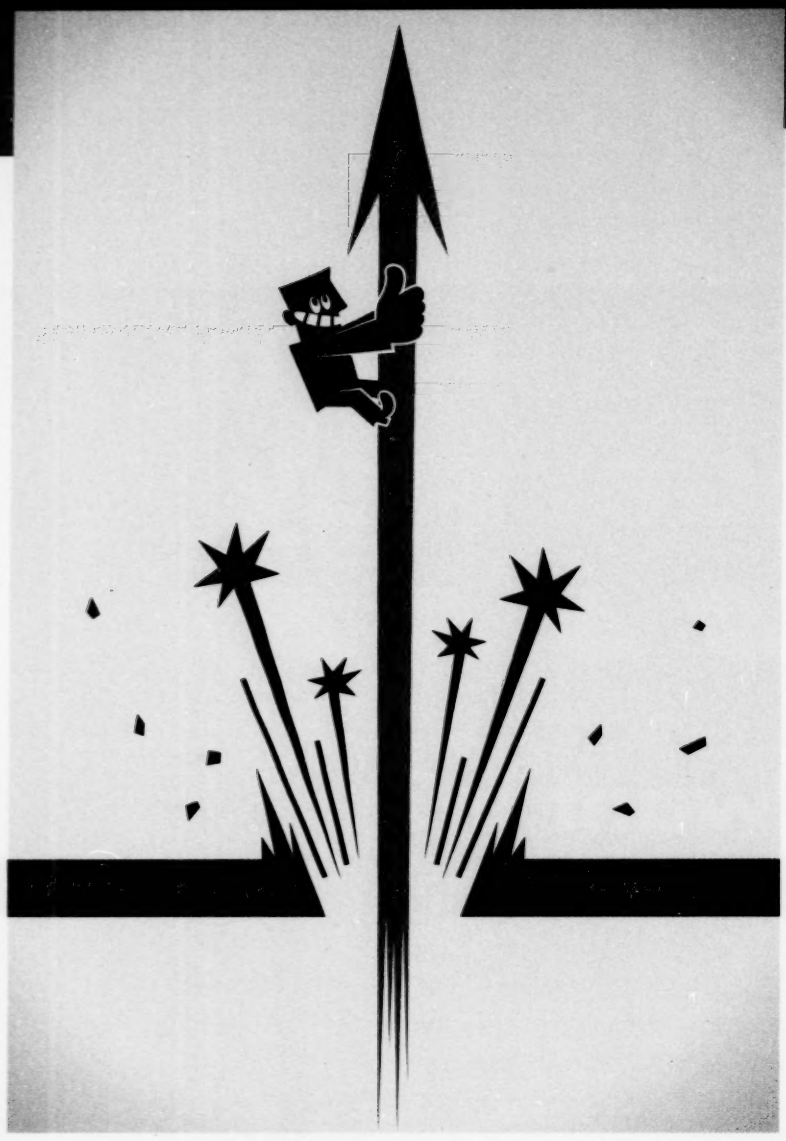

MASTER Disruptive Technologies

Upsetting the status quo is exactly the point, as companies dive into social networking, the cloud and more. **BY JULIA KING**

SOCIAL, MOBILE AND ANALYTICS TECHNOLOGIES are disrupting business as usual at companies in all industries. In 2014, the disruption will continue, morphing into a new kind of business as usual with enterprises expanding their reliance on the cloud, mobile technologies, social media and, increasingly, predictive analytics. The goals: reducing costs, creating new revenue streams, boosting customer satisfaction and beefing up brand awareness, to name a few.

In the next three to five years, the five technologies most likely to upset the status quo are social networking, the cloud and software as a service (SaaS), self-service IT, predictive analytics and mobile payments, according to *Computerworld*'s Forecast 2014 survey of 221 IT executives.

At Washington-based Special Olympics, that disruption is already well underway and yielding significant benefits, according to Noah Broadwater, head of digital products and technology.

"We have no real data center, and most things are cloud-enabled. We're already entirely on Office 365," Microsoft's SaaS-based suite of tools, says Broadwater.

Additionally, the nonprofit international sports organization, which has seven offices around the world and program offices in all 50 states, has hired a social networking expert and significantly expanded its presence on dozens of social sites, including Facebook, Twitter, Tumblr, Instagram and Pinterest. Broadwater measures the return on this investment not in dollars, but in doers.

"As a nonprofit, it's all about getting volunteers and getting people to come to events," Broadwater explains. "Social media is perfect for that. We use it as a means to get the word out and get people involved." The medium has been instrumental to the success of an initiative called Project Unify, which aims to include people with intellectual disabilities in established athletic events.

"We use social media to get people to be ambassadors for the program, and it has been phenomenal how successful it has been. We are targeting millennials and the generation after millennials, and social media is where they are," he notes.

Leveraging the cloud for data collection and analysis is another key initiative for Special Olympics, which, according to Broadwater, maintains the world's largest online database of

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health records of people with intellectual disabilities.

Looking ahead, the plan is to build data marts that integrate health data and competition data with a goal of understanding if and how health and participation in competitive athletics are related. "We're also tying in clinics that do nutritional studies," Broadwater says.

A New Approach to Manufacturing

At EWIE Co., an Ann Arbor-based commodity management and manufacturing services company, the goal in combining cloud and analytics technologies is nothing short of changing the $340 million company's strategic approach to its core business — machine maintenance.

"In the past, the mindset was to fix a machine when it breaks," says CIO Raman Mehta. That meant waiting for a failure to occur, then interrupting production — which could involve bringing down an entire assembly line — to make repairs.

Cloud and analytics technologies are now disrupting that way of doing business, enabling EWIE to shift to "condition-based monitoring," which entails machines continually streaming data about temperature, vibration levels, scrap production and other factors to a cloud-based EWIE system, so EWIE engineers can proactively intervene before a problem occurs.

"We are one of the first companies trying to get in to the core of manufacturing with a cloud offering," Mehta says. "It's one of our important growth opportunities," he says, noting that the new cloud-based monitoring and diagnostic service offering positions EWIE as a single point of contact with manufacturing customers for diagnostics, parts and repairs.

Additionally, EWIE engineers who work on-site at customers' manufacturing facilities — which can span the length of two or three football fields — now carry mobile devices so they can directly enter data about a machine's status, rather than jotting down the information and entering it into the system later.

"Once you capture data at the point of performance, the accuracy of that data is much higher," Mehta explains. And more-accurate data yields more-accurate maintenance schedules.

Mehta says top management at EWIE "loves the speed" at which IT can enable new service offerings by using the cloud. "They don't have to wait weeks for IT to procure more hardware and a software license and then be in a perpetual software [upgrade and enhancement] schedule," he says. Another benefit is that internal IT staff can shift their focus away from what Mehta describes as "nuts and bolts techie" concerns to become more aligned with the company's business goals.

The greatest challenge with the cloud, Mehta says, is ensuring the integration of older back-end systems to the newer cloud-based applications and services.

"It's easy to take your enterprise to the cloud, but very difficult to bring the cloud to your enterprise," he says. "We are not a greenfield company, so any cloud offering has to integrate and interoperate with existing information assets." That's why Mehta advises others looking to implement cloud technologies to focus on integration and the architecture behind the integration. "Integration is absolutely critical," he says.

His other advice is to work closely — perhaps more closely than before — with leaders in the business units so they understand that moving to the cloud involves trade-offs. For example, to collect information on mobile devices, EWIE had to change its established workflow to accommodate the software.

"The business gets speed and agility, but you also give up some customization," Mehta points out. "Once in the cloud, you are working with constraints that the software imposes. There needs to be a willingness to align our business processes and adapt."

Become best friends with your company's legal department before contracting with cloud vendors and other service providers. That's the first step in protecting your company's record retention and data privacy.

Hire or train a procurement specialist who understands both technology and contracts.

Find a partner in the business to jointly conduct pilot projects with disruptive technologies. Figure things out together in a controlled way.

Have a content plan, not just a technology platform, for social media.

Quick Action Required

Dave Finnegan, chief information and interactive officer at $394 million Build-A-Bear Workshop, knows all about adapting to outside forces and adjusting quickly to constraints imposed by providers. In the midst of rolling out its new "store of the future" concept, which incorporates leading-edge mobile and interactive touchscreen technology plus analytics and gamification elements, one of the St. Louis-based retailer's key technology providers decided to discontinue development on a technology that was a cornerstone of the project.

"One of the key challenges is that [vendors] can also change platforms really quickly, and not just move to a newer version of it, but discontinue it completely. We had to scramble for the next platform and how to build the next store-of-the-future elements. When [vendors] cancel or change direction, we have to be able to react," Finnegan says. "Things like that cause my biggest heartburn."

Finnegan has formed a core team of IT professionals dedicated to managing disruptive technologies and outside service vendors. "It helps us be really nimble with external players," he says.

The ROI on these technologies also has been significant. Last year, sales at newly designed store locations were up 30% or more.

Another — perhaps bigger — benefit of mastering disruptive technologies can't be measured in dollars but contributes directly to the company's long-term success.

"There's an excitement that is generated from stepping into the future," Finnegan says. "We found that our store-of-the-future initiative has served as a catalyst to thinking about innovation in our company in a unique way. We can use what we learned in the store-of-the-future concept and apply it to other parts of the business and how we drive innovation."

"It helps to breed next-generation thinking," he adds. "In that way, it's a very positive disruption for us." ◆

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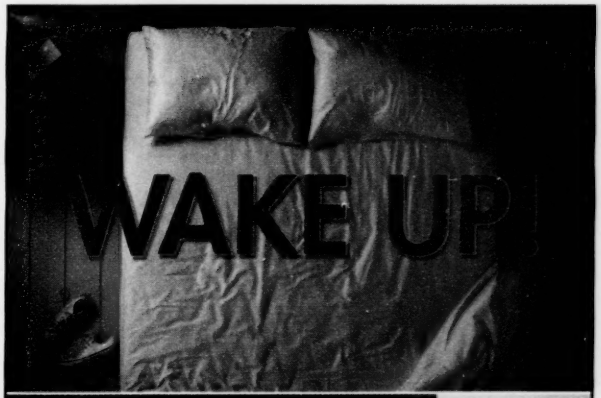

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THORNTON A. MAY

Fed Up With Blowhards, IT Will Fight Back in 2014

> **In 2014, the IT community will rise up and with one voice shout, 'We're mad as hell.'**

FRED POHL, a colorful figure in the world of imaginative literature, once commented, "A good science fiction story should be able to predict not the automobile but the traffic jam." In a similar vein, I think those practicing the mysterious arts of forecasting should expand upon the realities of the very clever and now consensus prophecy of the SMAC stack (social, mobile, analytics and cloud), migrate beyond the parameters of established opinion and assess what will really happen in 2014.

During the dark decade (2000-2010), IT became exceptional at operation. In 2014, IT will have to become excellent at *cerebration*. Investors, private equity firms, boards of directors and CEOs recognize that the path forward requires reflection. In a perfect metaphor for the reality that "a CIO's job is never done," high-performance CIOs — previously charged with connecting us to the world — will be busy deconnecting select executives from the onslaught of pings, alerts, tweets and likes and creating spaces where thinking can happen.

Once responsible for re-engineering the value chain and integrating the supply chain, CIOs will be responsible for enabling the "wisdom chain" in 2014. This is the multistage, high-speed process whereby an organization comes to know and act profitably in its environment.

Some readers might remember the '80s TV drama *Hill Street Blues*. In that gritty cop show, a sergeant would preside over daily roll call, laying out the priorities of the day. I label this a "mark-to-meaning" meeting.

I think *every* enterprise and *every* IT shop needs to have regularly scheduled mark-to-meaning meetings. The ones that do actively and aggressively seek to make sense of the changing world around them. Having a mark-to-meaning meeting places the supreme act of leadership — sense-making — on the agenda.

Classic examples of technology-enhanced/enabled mark-to-meaning meetings are the Monday morning Business Sphere sessions at P&G and the weekly use of the Situation Awareness Room at Scotts Miracle-Gro. In these meetings, executives are given a factual map of what happened, a forum to discuss why it happened and tools to decide what to do next.

In the 1976 film *Network*, Howard Beale (a newscaster played by Peter Finch) induces his viewers to shout out their windows, "I'm as mad as hell, and I'm not going to take this anymore!" In 2014, the IT community will rise up and with one voice shout, "We're mad as hell." My IT ethnography research reveals that our community is fed up with subscription research firms hiding behind a "nexus of forces," blowhards spewing erroneous stereotypes, and academics with 14 data points in their samples telling us that IT is doing a bad job. IT is doing a great job.

We are simultaneously chief infrastructure officer (keeping the lights on and managing existing systems), chief integration officer (bringing together internal and external data and systems), chief intelligence officer (fostering business intelligence and getting the right data to the right people), chief innovation officer (looking for disruptive technologies to drive innovation) and chief in-compliance officer (making sure all regulatory i's are dotted).

I suggest we all become chief "in your face" officers when people start bloviating about IT's failure to create value. ◆

Thornton A. May is author of *The New Know: Innovation Powered by Analytics* and executive director of the IT Leadership Academy at Florida State College in Jacksonville. You can contact him at thorntonamay@aol.com or follow him on Twitter (@deanitla).

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Software Engineer Positions (NY, NY) Design, develop, modify, and/or test software needed for various Google projects. Exp incl: **#1615.3379** Java; srvr side dvlpmnt; HTML, CSS, Jscript, & AJAX; cross-browser dvlpmnt; REST-based web srvcs; design, implement, test, & maint of modular sw components; & Linux. **#1615.7322** C, C++, multithread, & STL; Boost & XML; algorithms; dynamic program, design patterns, & Unified Modeling Language; & implement syst in OOL emphasizing multi-thread arch.

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TRUE TALES OF IT LIFE AS TOLD TO SHARKY

HAL MAYFORTH

Isn't 'Punch a Hole' a Metaphor?

Small company loses 10TB of data after a mishap at the office – with no backup and no way to get the data back, of course. Consultant pilot fish submits a bid for a complete backup system at a very reasonable price, and after a few days calls back to see what the customer decided. The customer's reply: "We're going with a disaster-recovery site solution. We punched a hole through the firewall and are copying all the data to a backup server on the other side." Says fish, "I was confused. This company generates several gigabytes of data in a day and only has a 3Mbps connection. The customer explained that it all works and has been verified by the company's on-site IT person. Not convinced, I got the customer's OK to do a site visit. And once I was there, I found that everything I was told on the phone was 100% accurate. There was a LAN cable going through the literal firewall of the building. On the other side, in the neighboring store, was a server to which all the company's data was backed up daily."

Unprintable

Company has dozens of sites, mostly connected via cable or DSL, so a downed Internet connection somewhere is common. To save time and effort, IT manager pilot fish emails instructions and contact information specific to each site. "The instructions include the steps to take and who to call should they lose their connection," fish says. "The steps basically are: First, make sure that you have power. Then power cycle the cable or DSL modem and firewall. Then call the Internet provider. Then call me. I also suggested printing out the information and setting it by the network equipment. The next week, I got two calls well before my normal work hours. Both times, I said, 'Tell me what steps you have taken already from the email I sent you last week.' They both told me they couldn't get to the instructions because their Internet was out and they couldn't get to email."

You Expected <3?

Consultant pilot fish's client moves to a faster connection with a different Internet provider. Now the client needs control of its domain name, which is registered with the old provider. "Their old provider was a reseller for a registrar," says fish. "When I made my request they said they would send credentials to log in to a domain control panel that would contain the provisioning code. The credentials were sent to the admin contact for the domain. The username was ordinary. The password was #sand. I guess that expresses what they think of customers who leave their service."

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PRESTON GRALLA

Time to Break Up Microsoft? Not So Fast

> There are increasing calls for Microsoft to sell off Bing and walk away from mobile.

NOW THAT STEVE BALLMER is on his way out the door, there are increasing calls for Microsoft to be split up by selling off or giving away Bing and walking away from the mobile business by killing off Windows Phone. But while doing that might make Wall Street happy by bringing in short-term profits, in the long run it would be disastrous for the company.

The call to sell off Bing started back in May, when Nomura Equity Research analyst Rick Sherlund proposed it. He argued that from an "ROI and strategic perspective" it makes sense for Microsoft to sell Bing to Facebook or Yahoo. His reasoning? Microsoft would be able to cut its Bing losses and get revenue from the buyer by routing users to Bing at so much per visit. He estimates Microsoft would generate $1 billion in profit a year that way, and eliminate $1 billion a year in losses.

"If this were returned to shareholders," Sherlund wrote in his report, "this could add nearly 1% incremental to the dividend yield, in our estimation."

Another prominent analyst targets another big chunk of Microsoft that he believes should be sliced off: its Windows Phone business. Ben Thompson argues that Ballmer's services-and-devices plan is bound to fail and that Microsoft should stick to services and abandon devices. The reason? "The danger is that the services that ought to be pushed, like Office 365, which could run on every platform, are going to die on the vine because of the emphasis on [Microsoft's own] devices," he told *Computerworld*.

There's certainly some evidence for that. With its own tablet business on life support, Microsoft has refused to release Office for the iPad and Android tablets. It may be forgoing billions of dollars as a result. Gerry Purdy of MobileTrax estimates that Microsoft could get $1.25 billion in additional revenue in the first year it released Office for the iPad and Android tablets, and $6 billion in annual revenue by 2017.

But the critics are wrong. Microsoft needs Bing and Windows Phone. Although getting rid of Bing might prove to be a short-term boost to Microsoft's stock price, the service is strategically vital for Microsoft's future. Bing is central to Microsoft's plans to take over the living room with the Xbox. It's a core component of Microsoft's big data plans, including for machine learning. And Bing is baked into the DNA of Windows 8, particularly in an interesting new app category that grabs multimedia content and fast-changing information from the Internet and formats and displays it on the fly.

As for abandoning Windows Phone, Microsoft's recent $7.2 billion deal to acquire parts of Nokia makes that a nonstarter. And Microsoft needs Windows Phone. Mobile, not services, is where the growth is. Without mobile, Microsoft will become a bit player in technology's future, and it will find it harder to attract talented engineers.

Services and devices can coexist in a company, if each division is allowed to pursue profit regardless of how it affects the other. In Microsoft's case, that means releasing Office apps for the iPad and Android, even if it makes it more difficult to sell Windows tablets.

The battle among giant tech companies today is between entire ecosystems, not individual products. Selling off important parts of Microsoft's ecosystem would make it much more difficult for Microsoft to compete. That harms, not helps, the company. ◆

Preston Gralla is a *Computerworld.com* contributing editor and the author of more than 35 books, including *How the Internet Works* (Que, 2006).

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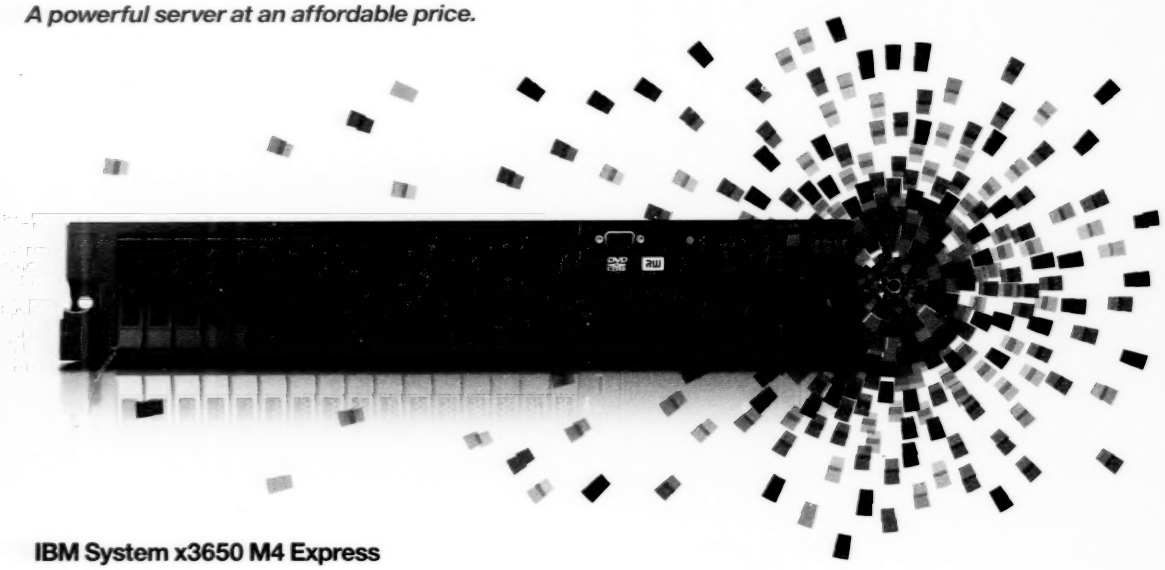

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[1]Source: Intel® Performance comparison using SPECfp*_rate_base2006 benchmark. Baseline score of 266 on prior-generation 2S Intel® Xeon® processor X5690-based (3.46GHz, 6 core, 12MB L3, 6.4 GT/s, 130W) platform published at www.spec.org as of 6 Sept 2011. New score of 492 on 2S Intel® Xeon® processor E5-2690 (2.90GHz, 8 core, 20MB L3, 8.0 GT/s, 135W) published at www.spec.org as of 28 March 2012 using two Intel® Xeon® processor E5-2690, Turbo Enabled, EIST Enabled, Hyper-Threading Enabled, 128GB memory (16 x 8GB DDR3-1600), Red Hat* Enterprise Linux Server 6.1 for x86_64, Intel® Compiler 12.1.

[2]Results achieved by comparing recommended system to IBM System x3650 (with Xeon® E5205) using IBM Systems Consolidation Evaluation Tool (https://roianalyst.alinean.com/stgi/). The comparison is between IBM System x3650 M4 and x3650 (does not include x3650 M2 or x3650 M3).

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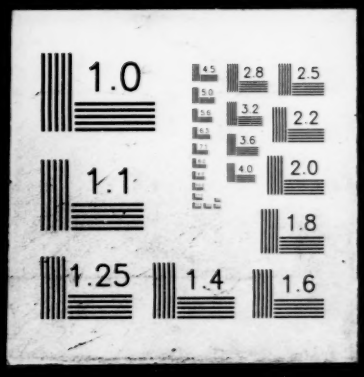
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